

PATENT COOPERATION TREATY

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REC'D 24 NOV 2005

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter II of the Patent Cooperation Treaty)

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(PCT Article 36 and Rule 70)

Applicant's or agent's file reference P399PC00	FOR FURTHER ACTION See Form PCT/IPEA/416																	
International application No. PCT/SE2004/001770	International filing date (day/month/year) 29-11-2004	Priority date (day/month/year) 02-12-2003																
International Patent Classification (IPC) or national classification and IPC A61N 5/10, A61B 6/00, G21K 5/10																		
Applicant Radinova AB et al																		
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of <u>6</u> sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> (sent to the applicant and to the International Bureau) a total of <u>2</u> sheets, as follows:</p> <p><input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) _____, containing a sequence listing and/or tables related thereto, in electronic form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p> <p>4. This report contains indications relating to the following items:</p> <table border="0"><tr><td><input checked="" type="checkbox"/> Box No. I</td><td>Basis of the report</td></tr><tr><td><input type="checkbox"/> Box No. II</td><td>Priority</td></tr><tr><td><input type="checkbox"/> Box No. III</td><td>Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</td></tr><tr><td><input type="checkbox"/> Box No. IV</td><td>Lack of unity of invention</td></tr><tr><td><input checked="" type="checkbox"/> Box No. V</td><td>Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</td></tr><tr><td><input type="checkbox"/> Box No. VI</td><td>Certain documents cited</td></tr><tr><td><input type="checkbox"/> Box No. VII</td><td>Certain defects in the international application</td></tr><tr><td><input type="checkbox"/> Box No. VIII</td><td>Certain observations on the international application</td></tr></table>			<input checked="" type="checkbox"/> Box No. I	Basis of the report	<input type="checkbox"/> Box No. II	Priority	<input type="checkbox"/> Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability	<input type="checkbox"/> Box No. IV	Lack of unity of invention	<input checked="" type="checkbox"/> Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement	<input type="checkbox"/> Box No. VI	Certain documents cited	<input type="checkbox"/> Box No. VII	Certain defects in the international application	<input type="checkbox"/> Box No. VIII	Certain observations on the international application
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Date of submission of the demand 10-06-2005	Date of completion of this report 15-11-2005																	
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Form PCT/IPEA/409 (cover sheet) (April 2005)

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/SE2004/001770

Box No. I Basis of the report

1. With regard to the **language**, this report is based on:

- ☒ the international application in the language in which it was filed
- ☐ a translation of the international application into _____
which is the language of a translation furnished for the purposes of:
- ☐ international search (Rules 12.3(a) and 23.1(b))
- ☐ publication of the international application (Rule 12.4(a))
- ☐ international preliminary examination (Rules 55.2(a) and/or 55.3(a))

2. With regard to the **elements** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

- ☐ the international application as originally filed/furnished
- ☒ the description:
- pages 1 - 23 _____ as originally filed/furnished
- pages* _____ received by this Authority on _____
- pages* _____ received by this Authority on _____
- ☒ the claims:
- pages _____ as originally filed/furnished
- pages* _____ as amended (together with any statement) under Article 19
- pages* 24 - 25 received by this Authority on 10-06-2005
- pages* _____ received by this Authority on _____
- ☒ the drawings:
- pages 1 - 11 _____ as originally filed/furnished
- pages* _____ received by this Authority on _____
- pages* _____ received by this Authority on _____
- ☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing (*specify*): _____
- ☐ any table(s) related to the sequence listing (*specify*): _____

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing (*specify*): _____
- ☐ any table(s) related to the sequence listing (*specify*): _____

* If item 4 applies, some or all of those sheets may be marked "superseded."

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/SE2004/001770

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	<u>1-8</u>	YES
	Claims		NO
Inventive step (IS)	Claims	<u>1-8</u>	YES
	Claims		NO
Industrial applicability (IA)	Claims	<u>1-8</u>	YES
	Claims		NO

2. Citations and explanations (Rule 70.7)

This report is based on the claims as filed with the letter of 2005-06-10.

Prior art

Reference is made to the following documents:

D1:US 5349198 A1

D2:US 5433693 A1

D3:US 4870287 A

D4:EP 0986070 A1

Document D1 discloses a device for beam supply for supplying proton beams, heavy particle beams etc. to devices which utilize such beams, such as cancer therapy equipment. The device discloses a rotatable beam transportation device (4) coupled to the downstream end of a rotatable deflection electromagnet (3). The device (4) is rotated together with the electromagnet (3). A plurality of beam utilization rooms (5) is disposed around the rotational axis of the rotatable deflection electromagnet (3). The beam, which is deflected by the electromagnet (3) and transported through the rotatable device (4), is led into a room (5) through a hole and utilized at the utilization point (6) of the room. The electromagnet (3) and the device (4) are rotated together to a predetermined angle by means of the rotation means (30). The utilization room (5) to which the beam is supplied can be switched by rotating the electromagnet and the device (4) by means of the

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Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of: BOX V

rotation means (30). It is noted that the rotatable beam transportation device (4) may include a part of the radiation device of the cancer therapy equipment (e.g. the beam collimator, the beam-scatterer, part of the x-ray positioning device etc.). It is further noted that the device (4) and the electromagnet (3) can be integrally rotated or rotated by separate rotation means. Furthermore, it is noted that the device (4) may be formed of several parts which are rotated individually. For example, in the case of the cancer therapy equipment, the part of the device (4) consisting of the elements used during beam radiation (e.g. the beam collimator) and the part of the rotatable beam transportation device (4) consisting of the elements used when no beam is radiated (e.g. the positioning device) may be rotated separately. (See for example column 3, line 20-column 4, line 37 and figures 1-5.)

Document D2 discloses a therapy apparatus where patient treatment rooms are circularly spaced around a nuclear reactor core and suitable shielding is provided between the rooms and the core. (See for example the abstract.)

Documents D3-D4 represent general prior art.

Statement of reason

The invention according to claims 1-10 discloses a radiation system comprising a gantry adapted for arrangement in connection with at least a first and a second treatment room and a radiation head mechanically supported by said gantry. A problem with prior art radiation therapy machines is their limited capacity in terms of the total number of patients that can be treated in a given time interval. The tedious set-up, positioning and simulation procedures lead to poor utilization of the costly radiation machines and few patients can be treated during a given period of time in the prior art radiation systems. The invention solves this problem by arranging said radiation head to be movable relative said gantry between a first position for directing a radiation beam into a first treatment room and a second position for directing said radiation beam into said second treatment room. The radiation system has integrated radiation treatment and simulator functionality that can be used in multiple treatment

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In case the space in any of the preceding boxes is not sufficient.

Continuation of: BOX V

rooms. In this way, it is possible to irradiate a first subject in a first treatment room while simultaneously performing a treatment set-up and simulation procedure for at least a second subject in a second treatment room using the same radiation treatment gantry. Thus the capacity of the radiation system in terms of the total number of subjects to be treated during a given period of time is much larger compared to machines of the prior art.

The amended claims filed with the letter of 2005-06-10 differ from the claims as originally filed in that it is now specified in the independent claim 1 that the gantry discloses a static gantry part arranged in the radiation-shielding separating member separating the treatment rooms. The amended claims also differ from the claims as originally filed in that it is now clearly specified in claim 1 that the radiation head is movable in a dedicated spacing in the separating member between the separate treatment rooms. Furthermore, the amended claims differ from the claims as originally filed in that it is now clearly specified in claim 1 that the system comprises a movable radiation shielding that is a part of the movable gantry part and which prevents radiation from reaching the second treatment room when the radiation head is in the first position and which prevents radiation from reaching the first treatment room when the radiation head is in the second position.

Document D1 discloses a radiation system comprising a gantry adapted for arrangement in connection with at least a first treatment room and a second treatment room separated by a radiation-shielding separating member. However, document D1 does not disclose a gantry having a static gantry part arranged in the radiation-shielding separating member separating the treatment rooms.

Document D2 discloses a therapy apparatus where patient treatment rooms are circularly spaced around a nuclear reactor core and suitable shielding is provided between the rooms and the core.

None of the documents D1-D2 disclose a radiation system with a radiation head that is movable in dedicated spacing in the

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Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of: BOX V

separating members between the different radiation rooms and none of the documents disclose a movable radiation shielding being a part of a movable gantry. Furthermore, none of the documents D1-D2 disclose a movable shielding being a part of the movable gantry part.

It is not considered obvious to a person skilled in the art to change the radiation system of any of the above mentioned documents so as to reach to a radiation system as the one claimed in the present application.

The invention according to claims 1-8 is thus novel and is considered to involve an inventive step. The invention according to claims 1-8 is industrially applicable.

CLAIMS

1. A radiation system (1) comprising:

- a gantry (100) comprising:

5 a static gantry part (140) adapted for arrangement in a radiation-shielding separating member (71) separating at least a first treatment room and a second treatment room (62); and

a movable gantry part (130) movably supported by said static gantry part (140);

10 - a radiation head (120) mechanically supported by said movable gantry part (130) and being movable relative said static gantry part (140) in a dedicated spacing in said separating member (71) between a first position for directing a radiation beam (110) into said first treatment room (61) and a second position for directing said radiation beam (110) into said second treatment room (62); and

15 - a movable radiation shielding (150) being a part of said movable gantry part (130) and preventing radiation from reaching said second treatment room (62) when said radiation head (120) is in said first position and preventing radiation from reaching said first treatment room (61) when said radiation head (120) is in said second position.

20 2. The radiation system according to claim 1, wherein said separating member (71) is selected from at least one of:

- a radiation-shielding partition between said first (61) and second (62) treatment room;

25 - a radiation-shielding ceiling-floor pair between said first (61) and second (62) treatment room, said first (61) and second (62) treatment room being positioned at different floors.

30 3. The radiation system according to claim 1 or 2, further comprising at least one radiation simulation head (200-1, 200-2), said simulation head (200-1, 200-2) being able to direct a radiation simulation beam (210-1) into said first treatment room (61) simultaneously as said radiation head (120) directs said radiation beam (110) into said second treatment room (62).

4: The radiation system according to claim 3, wherein said radiation simulation head (200-2) is movable on said gantry (100) between said first (61) and second (62) treatment room.

5 5. The radiation system according to claim 3 or 4, wherein said radiation head (120) is adapted for providing a treatment beam (110) and said radiation simulation head (200) is adapted for providing a treatment simulation beam (210).

10 6. The radiation system according to any of the claims 1 to 5, further comprising:

- a second gantry (100-2) adapted for arrangement in connection with at least said second treatment room (63, 64) and a third treatment room (65, 66) separated by a radiation-shielding separating member (71, 75, 77);
15 and

- a second radiation head (120-1) mechanically supported by said second gantry (100-2), said second radiation head (120-2) being movable relative said second gantry (100-2) between a first position for directing a radiation beam (110-2) into said second treatment room (63, 64) and a
20 second position for directing said radiation beam (110-2) into said third treatment room (65, 66).

7. The radiation system according to claim 6, wherein said radiation head (120-1) and said second radiation head (102-2) are configured for directing
25 said radiation beams (110-1, 110-2) into said second treatment room (63, 64) from different incident angles.

8. The radiation system according to claim 6 or 7, further comprising a radiation beam splitter for simultaneously providing radiation from a
30 common radiation source to said first gantry (100-1) and to said second gantry (100-2).
